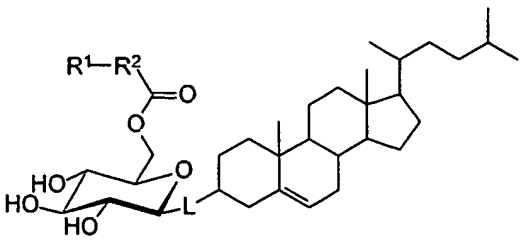
CLAIMS

1. A compound of formula A below, or a pharmaceutically acceptable salt or complex thereof, wherein the compound formula A comprises



wherein R^1 is selected from azido, amino, substituted amino, hydrazino, hydrazide, semicarbazide, or carbohydrazide;

R^2 is selected from a saturated or unsaturated carbon chain containing 1 to 25 carbon atoms, or a saturated to unsaturated substituted carbon chain containing 1 to 25 carbon atoms; and

L is selected from O, N, S, P, or an alkylene radical.

2. The compound of claim 1, wherein R^1 is selected from azido, amino or hydrazide; R^2 is a saturated or unsaturated carbon chain containing 5 to 20 carbon atoms; and L is O.

3. The compound of claim 2, wherein the compound is chemically synthesized.

4. The compound of claim 1, wherein L is O.

5. A conjugate comprising the compound of claim 1 and at least one protein carrier, wherein the compound of claim 1 is covalently bound to the protein carrier.

6. A conjugate comprising the compound of claim 2 and at least one protein carrier, wherein the compound of claim 2 is covalently bound to the protein carrier.

7. The conjugate of claim 5, wherein the compound of claim 1 is covalently bound to the protein carrier via the R^1 group.

8. The conjugate of claim 6, wherein the compound of claim 2 is covalently bound to the protein carrier via the R^1 group.

9. The conjugate of claim 5, wherein the protein carrier comprises bovine serum albumin, ovalbumin, keyhole limpet hemocyanin, purified protein derivative of tuberculin, tetanus toxoid, cholera toxoid, diphtheria toxoid, *Pseudomonas aeruginosa* toxoid, *Clostridium* toxoid, Shiga toxin, hepatitis B antigen, or a sequence of amino acids of a *Borrelia burdorferi* polypeptide.

10. The conjugate of claim 6, wherein the protein carrier comprises bovine serum albumin, ovalbumin, keyhole limpet hemocyanin, purified protein derivative of tuberculin, tetanus toxoid, cholera toxoid, diphtheria toxoid, *Pseudomonas aeruginosa* toxoid, *Clostridium* toxoid, Shiga toxin, hepatitis B antigen, or a sequence of amino acids of a *Borrelia burdorferi* polypeptide.

11. A method for making the compound of claim 1, wherein R^1 is azido and L is O, the method comprising:

reacting a galactosyl halide with cholesterol to provide a galactosyl-cholesterol; and

reacting an azidoacyl acid with the galactosyl-cholesterol to provide the compound of claim 1.

12. A pharmaceutical composition comprising a therapeutically effective amount of the compound of claim 1 and a pharmaceutically acceptable carrier.

13. A pharmaceutical composition comprising a therapeutically effective amount of the compound of claim 2 and a pharmaceutically acceptable carrier.

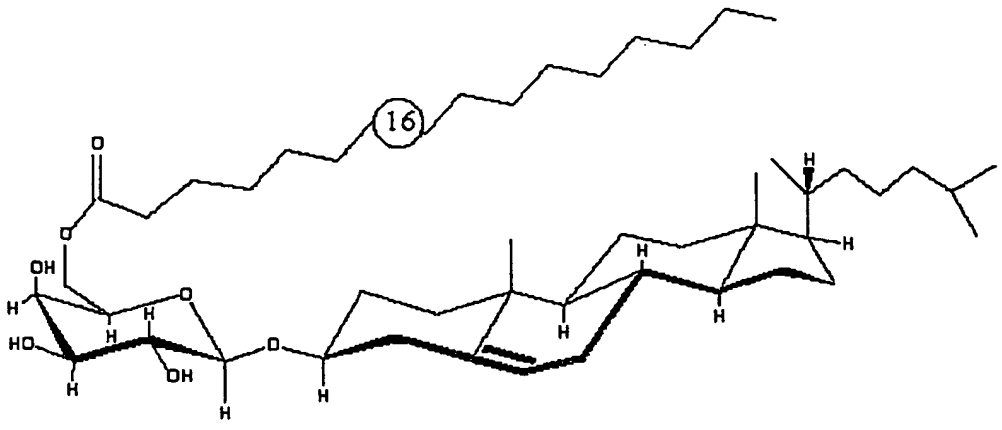
14. A pharmaceutical composition comprising a therapeutically effective amount of the conjugate of claim 5.

15. A pharmaceutical composition comprising a therapeutically effective amount of the conjugate of claim 6 and a pharmaceutically acceptable carrier.

16. A method of inducing an immune response to *B. burgdorferi* in a subject, comprising administering a therapeutically effective amount of the compound of claim 1 to the subject, thereby inducing the immune response.

17. A method of preventing or treating Lyme disease in a subject, comprising administering to a subject a therapeutically effective amount of the compound of claim 1, thereby preventing or treating Lyme disease in the subject.

18. A purified compound having a formula B below, or a pharmaceutically acceptable salt or complex thereof, wherein the compound formula B comprises



wherein "16" represents the number of carbon atoms in a palmitoyl group shown in the formula.

19. The compound of claim 18, wherein the compound is isolated from *B. burgdorferi*.

20. A pharmaceutical composition comprising a therapeutically effective amount of the purified compound of claim 18 and a pharmaceutically acceptable carrier.

21. A pharmaceutical composition comprising a therapeutically effective amount of the purified compound of claim 18 conjugated to at least one protein carrier.

22. A method of inducing an immune response to *B. burgdorferi* in a subject, comprising administering a therapeutically effective amount of the purified compound of claim 18 to the subject, thereby inducing the immune response.

23. A method of preventing or treating Lyme disease in a subject, comprising administering to a subject a therapeutically effective amount of the purified compound of claim 18, thereby preventing or treating Lyme disease in the subject.

24. The use of the compound of claim 1 to induce an immune response to *B. burgdorferi* in a subject, the use comprising administering a therapeutically effective amount of the compound of claim 1 to the subject, thereby inducing the immune response.

25. The use of the compound of claim 1 to prevent or treat Lyme disease in a subject, the use comprising administering to a subject a therapeutically effective amount of the compound of claim 1, thereby preventing or treating Lyme disease in the subject.

26. The use of the compound of claim 1 to prepare a medicinal formulation for inducing an immune response to *B. burgdorferi* in a subject.

27. The use of the compound of claim 1 to prepare a medicinal formulation to prevent or treat Lyme disease in a subject.

28. The use of the purified compound of claim 18 to induce an immune response to *B. burgdorferi* in a subject, the use comprising administering a therapeutically effective amount of the purified compound of claim 18 to the subject, thereby inducing the immune response.

29. The use of the purified compound of claim 18 to prevent or treat Lyme disease in a subject, the use comprising administering to a subject a therapeutically effective amount of the purified compound of claim 18, thereby preventing or treating Lyme disease in the subject.

30. The use of the purified compound of claim 18 to prepare a medicinal formulation for inducing an immune response to *B. burgdorferi* in a subject.

31. The use of the purified compound of claim 18 to prepare a medicinal formulation to prevent or treat Lyme disease in a subject.